Space Cubicle

Mathematics

Performance Task

Grades 6-8

by

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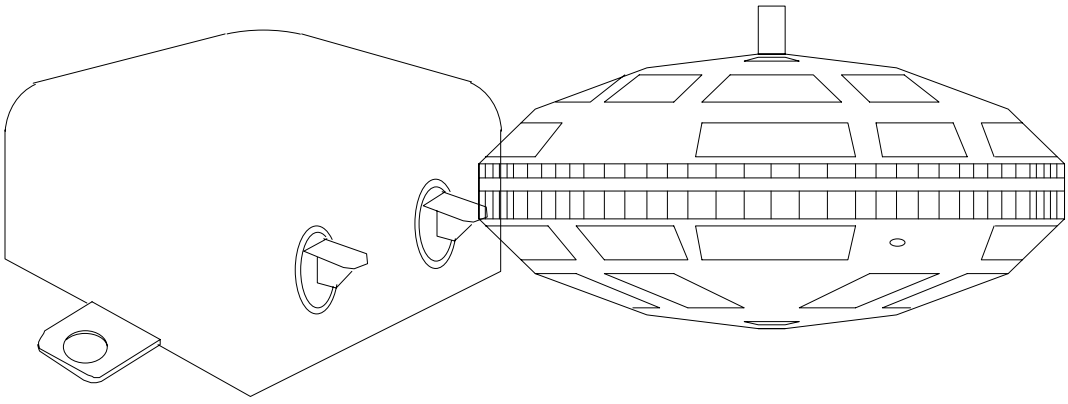

Southwest Regional MAP Center

Space Cubical

Purpose: This task is designed to assess the student's ability to recognize and define theoretical and actual problems encountered in the various disciplines and in life. Students will be required to use their mathematical skills of computation, drawing to scale, and finding area when designing a space cubicle and its contents.

Show-Me Standards Addressed:

Knowledge: M1, M2
Performance: 2.1, 4.1

Grade Level Range: 6-8

Subject Area: Mathematics

Time Needed for Task: two 45 minute class periods

Materials Needed: Performance Task Packet, ruler, meter stick/ yard stick, graph paper, glue, scissors, pencil

Instructions for Administration: Distribute the necessary materials to students. Tell students to use their lists of necessities and luxuries and their measurement data to do this task. Present students with the Performance Task Packet containing the Student Prompt, Student Response Sheets, and Scoring Guide. Make sure students understand what they are to do. Go over the scoring guide so students know what a quality product involves.

Pre-Assessment Instructions:

1. Pass out the student prompt sheet to the students. Be sure students read and understand the premise.
2. Organize students in groups of 3-4.
3. Have the groups generate two lists of items to include in a living space. Remind students that they will be spending the majority of their time in this space for two years. One list should be items necessary for civilized living. The other list will be luxury items. The teacher may want to give prompts by asking, "Do you need something on which to sleep?", "Do you need a toilet?", " Do you need a stereo?" etc.
4. Distribute graph paper and have students generate as many shapes as possible that can be contained within a 36 square unit area. The shapes need not be rectangles, but their total area should be less than 36 square units. Have groups share the varieties of shapes that can be contained within the specified area.
5. Lead a discussion of the relationship between area and perimeter and the advantages and disadvantages each shape would have if they were rooms. For example, amount of wall space, walking space and optimal means of accommodating furniture.
6. Give students opportunity to measure and explore relative sizes of furniture and any possible contents of their cubicle like sinks, tables, etc. Students may need to lie on the floor and imagine a or draw a chalk outline of an estimated size around them. They should record their measurements or estimates as reference data on the final task.

Space Cubicle: Student Prompt

Congratulations! Because of your outstanding record as a student and citizen, you have been selected to be the first student in space. You will be spending the next two years on a space station where you will live, observe the universe, and participate in scientific study and recreational activities. Before you go on your journey, you will be required to design your own living cubicle and submit it to the space station construction team.

1. Given 144 square feet (48 square meters), your list of necessities and luxuries, and the data you obtained from measuring, design your cubicle and the items you think are important to include. Be sure to consider room to walk around.

2. You will need to decide on a scale for your drawing. Each square on the graph paper should equal a given unit or set of units of measure. Be sure to write your scale on your final product.

3. Decide on the shape of your cubicle. You may start with several shapes and experiment with them.

4. Consider the data you obtained form measuring the different sizes of items. Draw the contents of your cubicle to scale and label them. Cut them out and arrange them in the cubicle.

5. When you are satisfied with your choices and their arrangement, paste them inside your cubicle design.

6. Write a paragraph or two which explains to the space station construction team and architects why you want the cubical to be the shape you have designed and why the arrangement of items in your living area is logical and practical. You must justify your choices or the construction team may make changes you don't want.

Your product must:

* be a drawn shape that contains an area of 144 square feet.

* have a scale which applies to both the area of the cubicle and its contents.

* have a paragraph or two which explains and justifies your choices for the shape of the cubicle and its contents and their arrangement.

Student Response Sheet #2: Space Cubicle Design Sheet

Use your list of necessities and luxuries and the data you obtained from measuring items to design your cubicle. Be sure to consider room to walk around. Include a scale for your space cubicle. Make sure it matches the scale used for the contents.

Scale

Space Cubicle: Student Response Sheet #3

Write a paragraph or two which explains to the space station construction team and architects why you want the cubical to be the shape you have designed and why the arrangement of items in your living area is logical and practical. You must justify your choices or the construction team may make changes you don't want.

Student Response Sheet #1: Contents Design Sheet

Consider the data you obtained form measuring the different sizes of items. Draw the contents of your cubicle to scale and label them. Cut them out and arrange them in the cubicle.

Scale

Space Cubicle Scoring Guide

4: Outstanding

- The response accomplishes prompted purpose.
- The cubicle is the required area and students have written a practical scale.
- Students clearly explain and illustrate understanding of the relationship between shape of the cubicle and considerations of area and perimeter.
- The space and all contents are drawn to the selected scale.
- The final product is logical, practical, and creative.
- The student's written response explains scale selection, cubical shape and contents chosen completely.
- Justification addresses issues of practicality and comfort.

3: Proficient

- The response will be similar to a 4 in completeness of task.
- The product may not exhibit the creativity of a 4 and student's written response may explain but not justify student decisions or explanation and justification may be incomplete or sketch.
- There may be minor inconsistencies in the scale.
- Product shows understanding of the relationship between shape of cubical and considerations of area and perimeter, but written explanation may not give explicit support.

2: **Emergent**

- Part of task is accomplished.
- Inconsistencies in scale clearly show lack of understanding of scaling dimensions.
- Student is not able to demonstrate understanding of the relationship between shape of cubical and practical considerations of area and perimeter.
- Written explanation is missing or unrelated to task.

1: Attempted

- Product is incomplete and their is no evidence to demonstrate student's understanding of scale, area, and perimeter.
- Explanation is unrelated or missing.